

## REMARKS

Claims 1-18 are currently pending in the present patent application. Claims 1 and 12 have been amended to recite that the characteristic determining the function of the slot is displayed in a binary representation. No new matter has been added by these changes since support therefor may be found in lines 24-29 of page 4 of the subject Specification, as originally filed. Claims 1 and 12 have also been amended to recite that the circuit board has multiple functions and that the specific function performed by a circuit board depends on the function-determining characteristic. Support therefor may be found on page 4, beginning on line 21, to line 3 of page 5 of the subject Specification, as originally filed.

In Section 22, Response To Arguments, of the subject Office Action, the Examiner stated that applicants' argued in the REPLY UNDER 37 CFR 1.111 filed on June 23, 2008, that: (1) the prior art does not teach the binary representation for each slot in an enclosure is chosen such that when a CRU is placed in the slot a sensing apparatus determines the configuration of the tabs and reports the configuration to circuits or processors located on the CRU that determine the function of the CRU from this information; that (2) the prior art does not change the function of the blade; and (3) the prior art does not determine the function of the module. The Examiner continued that applicants' arguments were fully considered, but were not persuasive for the following reasons.

The Examiner continued that concerning the first argument, applicants rely on a binary representation of the tabs in various configurations informing of various functionalities, but such is not recited in the rejected claims. At best, the Examiner asserted, claim 2 discloses that there are tabs present, but the claims remain silent that there are tabs that can be arranged in a certain manner in which a slot in an enclosure can detect a binary pattern and explicitly change the function of the inserted circuit board based upon a different arrangement of tabs.

Further, concerning the second argument, the Examiner stated that applicants rely on changing the function of the blade or circuit board, but the

claims necessitate only performing a function, and can be interpreted as performing only one function based upon a mere detection of presence. The Examiner continued that the claims do not necessitate an arrangement of tabs that can allow for a variance in the functionality of the apparatus let alone the circuit board itself.

Concerning the third argument, the Examiner stated that applicants require that determining the function of the circuit board can change the function of the circuit board, but there are no limitations in the claims that recite that the determination is more than a mere detection of presence by physical insertion, and that the characteristic of insertion being detected, thereafter establishes communication with the circuit board to perform the communicated function. That is, the Examiner asserted that the claims do not necessitate changing the function of the circuit board based upon a varying physical arrangement of tabs.

Applicants wish to thank the Examiner for having clarified the Examiner's position with respect to applicants' arguments, and have amended claims 1 and 12 to more clearly recite that the function of the circuit board is changed in accordance with instructions or directions received from an on-board processor once binary instructions are received by the processor identifying the function of the circuit board to be accessed when the circuit board is inserted into a slot.

In the subject Office Action, claims 12-17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ninomiya (U.S. Patent No. 5,809,330) in view of Crippen et al. (U.S. Publication No. 2004/0100765, hereinafter "Crippen") since, regarding claim 12, the Examiner stated that Ninomiya teaches a method for determining the function of a circuit board disposed in a slot (detection via connectors, element 26 and 27, figure 1) disposed in a slot in an enclosure comprising the steps of: displaying an identifying characteristic of the slot inside of the enclosure; detecting the circuit board; and directing the circuit board to perform the function associated of the slot (CPU enables connectors and determining of characteristics between expansion unit and main unit, element 11, figure 1).

**The Examiner continued that Ninomiya does not explicitly disclose interpreting the characteristic of the circuit board and performing a function accordingly,** but that Crippen teaches a method of detecting the displayed characteristic on the circuit board; interpreting the detected characteristic on the circuit board; and directing the circuit board to perform the function associated with the interpreted characteristic of the slot. The Examiner then concluded that it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the teachings of Ninomiya with that of Crippen since one of ordinary skill would make such modification in order to allow for authentication and appropriate function of a disposed circuit.

The Examiner noted that the determination of the function of a circuit board is not limited to one step of the photo-sensor detecting presence of an inserted option card. Once a card is inserted, the Examiner continued, the apparatus of Ninomiya has a photo-sensors 30 and 31 figure 1, in conjunction with photo-emitters which generates card detection signals DTE1 and DTE2, as can be seen from the citation from the original Office Action. Therefore, the Examiner asserted, upon generation of the DTE signals the process corresponds with address decoders that receive and decode the I/O address supplied to the system and the characteristics can be matched as seen in FIG. 4 and further can be configured via the I/O address map to determine the characteristic functionality of the option card seen in FIG. 5. Thus, the examiner reasserted that the originally cited photo-sensor represents the detection step of an entire process of determining the characteristic and that Ninomiya teaches the entire analogous process. Furthermore, the Examiner understands the displaying characteristic as a process to detect a presence of an circuit card characterized by the insertion of the card which is analogous to Ninomiya including photo-sensors detecting the particular presence of and option card characterized by the insertion of a particular card as seen in column 7, lines 46-58.

Applicants respectfully disagree with the Examiner concerning the rejection of claims 12-17 under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen et al. since as will be set forth hereinbelow,

applicants believe that independent claim 12, as amended, is patentable thereover. Although dependent claims 13-17 were rejected for reasons set forth by the Examiner in the subject Office Action, applicants believe that no further response is required concerning these claims since if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5USPQ2d 1596 (Fed. Cir. 1988).

Claims 1-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen and further in view of Lee (U.S. Patent No. 5,748,912) since the Examiner stated that, as per claim 1, Ninomiya/Crippen teaches an apparatus for determining the function of a circuit board disposed in a slot in an enclosure and in electrical communication with said enclosure, which comprises in combination: (a) means located within said enclosure for displaying an identifying characteristic of the slot; (b) means disposed on said circuit board for detecting the characteristics; and (c) a processor for interpreting the detected characteristic and for directing said circuit board to perform the function associated therewith.

The Examiner continued that Ninomiya/Crippen does not disclose a processor disposed on said circuit board, but that Lee analogously teaches an option card with a processor disposed on said circuit board. The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to insert the option card of Lee into the option card slot of Ninomiya/Crippen since one of ordinary skill in the art would be motivated to make such modifications in order to allow for an efficient and flexible means for users to replace a processor in a unit without exorbitant costs.

The Examiner again noted that the determination of the function of a circuit board is not limited to one step of the photo-sensor detecting presence of an inserted option card. Once a card is inserted the apparatus of Ninomiya has a photo-sensors 30 and 31 figure 1, in conjunction with photo-emitters which generates card detection signals DTE 1 and DTE2, as can be seen from the citation from the original office action. Upon generation of the DTE signals the process corresponds with address decoders that receive and decode the I/O

address supplied to the system and the characteristics can be matched as seen in FIG. 4 and further can be configured via the I/O address map to determine the characteristic functionality of the option card seen in FIG. 5. Thus the examiner reasserts that the originally cited photo-sensor represents the detection step of an entire process of determining the characteristics and Ninomiya teaches the entire analogous process.

Applicants respectfully disagree with the Examiner concerning the rejection of claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen et al. and further in view of Lee since, as will be set forth hereinbelow, applicants believe that independent claim 1, as amended, is patentable thereover. Although dependent claims 2-10 were rejected for reasons set forth by the Examiner in the subject Office Action, applicants believe that no further response is required concerning these claims since if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5USPQ2d 1596 (Fed. Cir. 1988).

Claims 11 and 18 were also rejected under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen in view of Lee, and further in view of Pope et al. (U.S. Patent No. 4,781,066) since the Examiner stated that Ninomiya modified by the teachings of Lee as applied in claim 1 above as per claims 11 and 18, fails to teach and apparatus wherein said means disposed on said circuit board for detecting the characteristic of the slot comprising a Hall-effect apparatus, but that Pope et al. analogously teaches an apparatus wherein said means disposed on said circuit board for detecting the characteristic of the slot comprises a Hall-effect apparatus. The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the combination of Ninomiya and Lee with the above teaches of Pope et al. since one of ordinary skill would have been motivated to make such modification in order to have a detection system that permits enhanced sensitivity and noise immunity in the system.

Applicants respectfully disagree with the Examiner concerning the rejection of claims 11 and 18 under 35 U.S.C. 103(a) as being unpatentable over

Ninomiya in view of Crippen et al. in view of Lee, and further in view of Pope et al. since, as will be set forth hereinbelow, applicants believe that independent claims 1 and 12, as amended, are patentable thereover. Although dependent claims 11 and 18 were rejected for the reasons set forth by the Examiner in hereinabove, applicants believe that no further response is required concerning these claims since if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5USPQ2d 1596 (Fed. Cir. 1988).

Turning now to the rejection of claims 12-17 under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen et al., the present invention teaches the use of identical, multifunction modules having different functions in slots of an enclosure, such as a storage array enclosure. Among the reasons for using identical modules are cost savings, and a reduction in the error rate associated with introducing an incorrect module into a bin which appears to be identical to other slots. Such modules are referred to as customer replaceable units (CRUs). In order that a particular module operate in accordance with its desired function within a group of modules, the module needs to "know" in which slot it has been placed. Once its location is identified, pre-programmed circuitry in the module can perform properly.

Beginning on line 18 of page 4 and ending on page 5, line 7 of the subject Specification, as originally filed, it is stated that: "In accordance with one embodiment of the present invention, each slot in an enclosure that houses multiple CRUs has a set of mechanical tabs arranged in a binary fashion. **The binary representation for each slot in an enclosure is chosen such that when a CRU is placed in the slot a sensing apparatus determines the configuration of the tabs and reports the configuration to circuits or processors located on the CRU that DETERMINE the function of the CRU from this information.** Thus, each CRU can identify its unique slot location within the enclosure. If a chosen CRU is moved to another location, it identifies the new location based on the mechanical binary configuration of the new slot. In this manner, CRUs can be removed for service operations such as repair or

upgrading, and replacement CRUs can be inserted into the same slot with certainty of their function within the overall system. A variety of sensors may be used to determine the presence or absence of a mechanical tab, including micro switches, Hall-effect devices, or LED sensors, or a combination of these or other devices. The number of tabs is determined by the number of slot locations to be uniquely identified." (Emphasis added by appellants.).

Subject claim 12, as amended, recites in part: "...displaying an identifying characteristic of the slot in a binary representation inside of the enclosure; detecting the binary representation of the displayed characteristic on the multifunction circuit board; interpreting the binary representation of the detected characteristic on the multifunction circuit board; and directing the circuit board to perform that particular function of the multifunction circuit board associated with the interpreted characteristic of the slot." (Emphasis added by appellants.). Clearly, claim 12 requires that the circuit board detect and interpret the displayed characteristic of the slot, and perform the function associated with the characteristic of the slot. The computer or controller already "knows" the address of the slot since this has already been determined, and the difficulty addressed by Ninomiya, that of conflicting addresses is not present. Moreover, the function of the expansion card of Ninomiya is already determined by the expansion card and **not** by the slot into which it is inserted.

Further, subject claim 1, as amended, recites: "An apparatus for determining the function of a multifunction circuit board disposed in a slot in an enclosure and in electrical communication with said enclosure, which comprises in combination: (a) means located within said enclosure for displaying an identifying characteristic of the slot in a binary representation; (b) means disposed on said multifunction circuit board for detecting the binary representation of the characteristic; and (c) a processor disposed on said circuit board for interpreting the detected binary representation of the characteristic and for directing said multifunction circuit board to perform that particular function of said multifunction circuit board associated with the detected characteristic." (Emphasis added by appellants.).

Thus, the present claimed invention teaches and claims a system and method which provides the identity of the slot in which a module (CRU) is inserted. The function of that particular slot is then "known" to the module, and the module is directed to perform the function associated with the slot. That is, once the CRU "knows" in which slot it has been placed, preprogrammed circuitry in the module is directed to perform in accordance with the function of the slot as mandated by its identity. A module or circuit board may therefore perform a variety of functions depending on which slot it is inserted.

Clearly, both independent claims recite that **the circuit board is directed to function in accordance with the detected characteristic of the slot in which the circuit board is inserted.**

Turning now to paragraph [0030] of Crippen, wherein it is stated that: "... The I2C serial links are used by the management module to internally provide control of the switch module and to collect system status and vendor product data ('VDP') information. ... In general, the active management module can detect the presence, quantity, type, and revision level of each blade, power module, blower and midplane in the system, and can detect invalid or unsupported configurations. ... This function relies upon VPD information within each subsystem as well as signals from the various hardware interfaces or communications via the service process protocols." (Emphasis added by appellants.). Clearly, **the management module of Crippen simply detects vendor product data to determine invalid or unsupported configurations.** The management module of Crippen **DOES NOT CHANGE THE FUNCTION OF THE BLADE** which is determined by the manufacturer; by contrast, **the management module checks for problems with the blade.**

The purpose of the invention of Ninomiya is described in Col. 1, lines 36-48, thereof, wherein it is stated that: "However, in order to correctly set the jumpers or dip switches, it must be determined whether the I/O address area is already in use by I/O devices such as various types of peripheral LSI controllers built into the portable computer, or by a different option card already connected to an expansion connector. This operation is extremely difficult for a user. If the



option card's I/O address area is mistakenly set using the jumpers or dip switches to an I/O address area that overlaps with an I/O address area already in use either by an internal I/O device in the portable computer or by a different option card, the portable computer will malfunction." The invention of Ninomiya is described in Col. 2, lines 5-20 as follows: "It is therefore an object of the present invention to secure operation of the entire system, including option cards, regardless of the values set for the I/O address areas of said option cards. This invention was designed with this point in mind, and is intended to provide a computer system in which even if the user sets the option card's I/O address area to a value overlapping with the I/O address of an internal I/O device in the portable computer, the proper operation of the entire system, including the option card, may be secured, and in which normal operation of the computer system is possible regardless of the set value of the I/O address area for the option card." (Emphasis added by appellants.).

In Col. 2, lines 56 to Col. 3, line 10, Ninomiya continues that: If the I/O address area requested by an expansion device such as an option card connected to the expansion connector is the same as the first I/O address area, the request for access to the internal I/O device is also received by the expansion device. Consequently, a state of contention occurs for access to the internal I/O device and access to the expansion device, as a result of which the internal I/O device cannot be accessed normally. On the other hand, if the I/O address area requested by the expansion device is different from the first I/O address area, the internal I/O device may be accessed normally. Therefore, by determining whether or not the internal I/O device was accessed normally, it may be determined whether the internal I/O device address area overlaps with the expansion device address area. If it is determined that the I/O address areas overlap, the address area assigned to the internal I/O device is automatically changed to a second I/O address area different from the first I/O area. In this way, the I/O address area for the expansion device may be prevented from overlapping with the I/O address area for the internal I/O device no matter what value to which the I/O address area requested by the expansion device is set."

Further, Col. 7, lines 46-56, if Ninomiya state: "The expansion unit 2 contains a connector 27, expansion slots including expansion connectors 28 and 29, as well as photosensors 30 and 31 to determine the presence of a card. The connector 27 has a configuration and pin placement scheme enabling it to connect to the expansion connector 26. Various types of expansion devices are detachably connected to each of a number of expansion units 28 and 29 belonging to the expansion unit 2. Expansion devices include modem cards, sound cards, graphics adapter cards, SCSI interface cards, multiple I/O cards and other types of ISA Option cards, as well as PCMCIA-type IC cards." Column 8, lines 4-19, of Ninomiya state: "The photosensor 30 is a card detection device that detects whether option card 32 is connected to the expansion connector 28, and is located in the card insertion path of the expansion slot. As shown in the drawing, the photosensor 30 has two protrusions, one side of which is equipped with a photoemitter and the other side of which, facing the first, is equipped with a photoreceptor. When an option card 32 is connected to the expansion connector 28, the passage of light in the space between these two protrusions, that is, the space between the photoemitter and the photoreceptor, is obstructed by the insertion of the option card 32. In this event the photosensor 30 generates a card detection signal DTE1 indicating that the option card 32 was inserted in the expansion slot. The card detection signal DTE1 is sent to the system controller 12 via the connectors 27 and 26, and a flag indicating the insertion of a card is thereupon set in a prescribed status register in the system controller 12."

Additionally, Col. 8, lines 27-41 of Ninomiya states: "Card detection devices employing photosensors (light permeable type or reflective type) as shown in this embodiment are most desirable from the standpoint of accuracy of detection, in terms of such points as reliability, durability and efficiency of space utilization, but card insertion may also be detected by means of a microswitch, for example, or through detection of a change in voltage to certain pins of the expansion connector. The option cards 32 and 33 have address decoders that receive and decode the I/O addresses supplied from the system, determine whether these I/O addresses are the I/O addresses they requested, and said

cards operate when it is determined that these I/O addresses are the I/O addresses they requested.”

Ninomiyi therefore teaches away from determining or selecting or defining the function of the module as is recited in subject claims 1 and 12.

Appellants respectfully believe that the Examiner continues to misinterpreted the word “determine” in subject claims 1 and 12. In the present patent application, “determine” clearly means to define or direct or select the function of the module. This is most emphatically stated in the final recitation of both subject claims 1 and 12: “...directing said circuit board to perform the function associated therewith.”, or “... directing the circuit board to perform the function associated with the interpreted characteristic of the slot.”, respectively. The American Heritage Dictionary of The English Language, Third Edition, defines “determine” as: “... 4. To be the cause of; regulate ... 5. To give direction to ... 6. To limit in scope or extent. 7. *Mathematics*. To fix or define the position, form , or configuration of. ... .”, and “direct” as: “1. To manage or conduct the affairs of; regulate. ... 4. To cause to move toward a goal; aim. ... .”

Section 2111.01I VI. of the Manual Of Patent Examining Procedure recites: “An applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning(s). See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994).”

As stated hereinabove, the present invention teaches the use of identical modules having different functions in slots of an enclosure, such as a storage array enclosure. In order that a particular module operate in accordance with its desired function within a group of modules, the module needs to “know” in which slot it has been placed. Once its location is identified, pre-programmed circuitry in the module can perform properly. The binary representation for each slot in an enclosure is chosen such that when a CRU is placed in the slot a sensing apparatus determines the configuration of the tabs and reports the configuration to circuits or processors located on the CRU that DETERMINE the function of the CRU from this information. Thus, the second use of the word “determine” in the

previous sentence means "directing the circuit board to perform the function associated with the interpreted characteristic of the slot," as is claimed in independent claims 1 and 12.

Ninomiya does not teach an apparatus or method for determining the function of a circuit board dependant on the identity of the slot in which it is disposed, as is recited in both of subject independent claims 1 and 12. That is, Ninomiya does not teach that the system can define the function of an I/O device. Rather, the function of a particular module or circuit board is the same, predetermined function, independent of the slot in which it is inserted in accordance with the teachings of Ninomiya.

In the Abstract, Ninomiya states: "Among devices on the system board, all devices other than those devices essential to the operation of the system such as system timer **19** and real-time clock **20**, i.e., I/O devices **24** and **25**, are constructed such that their environment may be configured and changed. If the hardware resources allocated to I/O devices **24** and **25**, such as I/O address areas, interrupt levels, etc., overlap with the hardware resources requested by option cards **32** or **33**, the hardware resources allocated to I/O devices **24** and **25** are automatically changed. As a result, the internal I/O devices and option boards can always be made to operate normally, regardless of the values set for the I/O address areas, etc. for option cards 32 and 33." (Emphasis added by appellants.). The invention of **Ninomiya does not alter the function or operation of the option cards** which may operate **normally**; rather, the addresses thereof may be changed in order to permit the portable computer of Ninomiya to function properly.

Thus, appellants believe that the Examiner has not rendered obvious the teachings of the present invention by combining Ninomiya with Crippen since the combination thereof does not disclose or suggest any manner where replaceable modules may function in accordance with the slot into which they are placed. Therefore, appellants respectfully believe that the Examiner has not made a proper *prima facie* case for obviousness in the rejection of claims 12-17 under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen et al.

Turning now to the rejection of claims 1-10 under 35 U.S.C. 103 (a) as being unpatentable over Ninomiya in view of Crippen further in view of Lee, appellants wish to point out that Lee does not teach an option card in FIG. 2B, as suggested by the Examiner; rather, Lee teaches a replaceable, user-removable CPU card, as stated in the Abstract: "A user-removable CPU card includes a microprocessor and a bus bridge memory controller that allows the use of the microprocessor as a central processing unit of an electrical device (e.g. notebook PC or desktop PC). ... Inclusion of a central processing unit of a computing device on a user-removable CPU card allows easy replacement of the CPU, for example, by simply opening a door and operating an eject mechanism, without disassembly of the housing. Therefore, a user can upgrade to a new central processing unit by simply ejecting a previously inserted user-removable CPU card and inserting a new user-removable CPU card, as easily as switching diskettes in the prior art (except for powering up the electrical device after such switching)." Appellants therefore fail to understand the Examiner's combination of Lee with Ninomiya and Crippen.

Concerning the rejection of claims 11 and 18 under 35 U.S.C. 103(a) as being unpatentable over Ninomiya in view of Crippen in view of Lee, and further in view of Pope et al., appellants wish to point out that Pope et al. in Col. 6, lines 36-40, states: "Processing of the pulse-like signals from the Hall Effect element **79** would be substantially the same as described for the processing of the pulse-like signals from the light detector element **49** of the first embodiment of the invention." Further, the Abstract of Pope et al. states in part: "Linear sensing apparatus for a positive displacement meter includes relative to each piston of the meter, and elongated rectangular member rigidly attached at one end to the top face of its associated piston, and carrying at its other end a multiwindowed member that reciprocates back and forth with movement of the piston for alternately interrupting detectable energy flowing between energy transmitting and detecting devices, the detecting device converting the detected energy into alternating electrical signals analogous to the volume of fluid passed through the meter, whereas the signals are processed via a microprocessor for obtaining the

actual volume and/or price of the fluid passed through the meter over a given period of time.” The present invention does not teach pulse-like signals for measuring fluid flow; rather, a module is inserted into a slot of an enclosure and remains there during a period of use. Therefore, appellants fail to understand the Examiner’s combination of Pope et al. with Ninomiya and Crippen in view of Lee.

Further, as stated hereinabove, Ninomiya teaches away from determining or selecting or defining the function of the module as is recited in subject claims 1 and 12.

As a result, the Examiner has improperly combined Ninomiya with any of Crippen, Lee and/or Pope et al. in a rejection under 35 U.S.C. 103(a). Please see, e.g., Article 2145, Section X. D. of the Manual of Patent Examining Procedure, which states that: “A prior art reference that ‘teaches away’ from the claimed invention is a significant factor to be considered in determining obviousness; however, ‘the nature of the teaching is highly relevant and must be weighed in substance.’”.

Therefore, appellants believe that the Examiner has failed to provide a *prima facie* case for obviousness as is required in a rejection under 35 U.S.C. 103(a).

Additionally, applicants have amended claims 1 and 12 to fully respond to the Examiner’s position as set forth in the Response To Arguments.

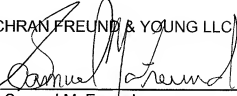
In view of the discussion presented hereinabove, appellants believe that subject claims 1-18 are in condition for allowance, or appeal, the former action by the Examiner at an early date being earnestly solicited.

Reexamination and reconsideration are respectfully requested.

Respectfully submitted,

COCHRAN FREUND & YOUNG LLC

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By: 

Samuel M. Freund  
Reg. No. 30,459  
2026 Caribou Drive, Suite 201  
Fort Collins, Colorado 80525  
Phone: (970) 492-1100  
Fax: (970) 492-1101  
Customer No.: 27479